REMARKS

In view of the following discussion, the Applicants submit that none of the claims now pending in the application is anticipated under the provisions of 35 U.S.C. § 102 or made obvious under the provisions of 35 U.S.C. § 103. Thus, the Applicants believe that all of these claims are now in allowable form.

In addition, the Applicants' representative would like to thank Examiner Couso for kindly taking a substantial amount of time on October 12, 2004 to discuss the merits of the subject invention. The Applicants' representative is aware of the time constraint that is placed on the Examiner and is appreciative of the Examiner's willingness to devote such large quantity of time to discuss the case on the merits.

I. ALLOWABLE SUBJECT MATTER

The Applicants thank the Examiner for her comments regarding the allowability of claims 5, 6, 10, 11, 20, 21 and 23, if rewritten in independent form to include all of the limitations of the base claim and any intervening claims. The Applicants submit that claims 44-50, previously submitted as new claims and not addressed by the Examiner in the present Office Action, present claims 5, 6, 10, 11, 20, 21 and 23 in such a form. However, in light of the arguments presented below, the Applicants respectfully submit that claims 1 and 16, from which claims 5, 6, 10, 11, 20, 21 and 23 depend, are patentable over the cited references. Therefore, the Applicants respectfully submit that claims 5, 6, 10, 11, 20, 21 and 23 are in allowable form as they stand.

II. REJECTION OF CLAIMS 1-4, 9, 12-13, 16-19 AND 22 UNDER 35 U.S.C. § 102

The Examiner has rejected claims 1-4, 9, 12, 16-19 and 22 in the Office Action as being anticipated under 35 U.S.C. §102(e) by the Tyan patent (United States Patent No. 6,473,517, issued on October 29, 2002, hereinafter Tyan). In response, the Applicants have amended claims 1 and 16 to more clearly define aspects of the Applicants' invention.

Tyan teaches a method for recognizing a license plate number in an image of a

license plate. A captured image of a license plate is preprocessed in at least one of two ways to enhance subsequent character recognition results. A first preprocessing technique compensates for tilt or skew of the license plate along a single axis in the image by adjusting (*e.g.*, rotating) the image in the axis of tilt (*see* Tyan, column 5, lines 40-46: "A license plate ... is tilted by an angle with respect to the horizontal axis ... [T]his angle is then corrected to give an image with a rotation angle of about zero degrees ..."). In a second refinement step, the position of the license plate within the image may be further refined by cropping regions of the image that are not necessary for recognition of the license plate number (*e.g.*, the plate frame or the body of the vehicle to which the plate is attached; *see*, Tyan, column 5, lines 51-53: "It is necessary to perform a refined localization that leaves out unnecessary regions but retains plate characters."). Once the region of the license plate is localized in this manner, portions of the license plate number may be iteratively segmented into suspected character regions, which are subjected to optical character recognition (OCR) processing in order to identify the license plate number depicted in the captured image.

The Examiner's attention is directed to the fact that Tyan fails to disclose or suggest the novel invention of performing a three dimensional adjustment of a detected text region to produce a rectified or corrected image, as claimed in Applicants' independent claims 1 and 16. Specifically, Applicants' claims 1 and 16 positively recite:

1. Method for recognizing text in a captured imagery, where said captured imagery is of a three-dimensional scene, said method comprising the steps of:
(a) detecting a text region in the captured imagery;
(b) adjusting in all three dimensions said detected text region to produce a rectified image; and
(c) applying optical character recognition (OCR) processing to said rectified image to recognize the text in the captured imagery. (Emphasis added)

16. Apparatus for recognizing text in a captured imagery, where said captured imagery is of a three-dimensional scene, said apparatus comprising:
means for detecting a text region in the captured imagery;
means for adjusting in all three dimensions said detected text region to produce a rectified image; and
means for applying optical character recognition (OCR) processing to said

rectified image to recognize the text in the captured imagery. (Emphasis added)

Applicants' invention is directed to a method and apparatus for recognizing text in an image sequence of scene imagery, *e.g.*, where the text information is incidental to some other subject being recorded and the position or angle of the text information may therefore render the text difficult to recognize using conventional OCR methods. In many circumstances, it is desirable to identify incidental text information captured in an imagery (*e.g.*, a three-dimensional scene of the real world), such as a name on a street sign. Conventional text recognition programs and systems typically operate on the assumption that the text lies in a plane that is orientated roughly perpendicular to the optical axis of the camera (*e.g.*, as in the case of a document placed on a scanner). However, in the case of text that is incidental to a main subject being recorded, such as text on street signs, billboards or name plates, the text often lies in a plane that is orientated at an oblique angle, and the text therefore may not be easily or accurately recognized by conventional OCR methods.

The present invention provides a method and apparatus for recognizing text in a captured imagery in which detected text regions are adjusted in three dimensions to account for distortion due to non-perpendicular alignment with an optical axis of a camera recording the imagery. The detected text regions may be both rotated and stretched to produce a rectified (*e.g.*, distortion-compensated) image. These rectified images are then subjected to OCR processing in order to recognize the text contained therein. Thus, by adjusting the text regions in three dimensions, the method can compensate for non-perpendicular text orientation angles, thereby producing a more accurate result.

In contrast, Tyan teaches a method for preprocessing a character region in a captured image of a license plate by adjusting the character region in two-dimensions at most, and then cropping extraneous imagery in the captured image. In other words, Tyan only teaches adjusting the text regions in no more than two dimensions followed by a simple cropping operation, which does not amount to an adjustment in three dimensions as claimed by the Applicants. Thus, Tyan fails to anticipate or make

obvious Applicants' invention.

Specifically, Tyan only teaches the detection and/or correction of skew in an intentionally captured image of a vehicle license plate due to a tilt of a captured character region along a single axis. The skew correction requires adjustment of the character region in two dimensions, at most (for example, the text may be rotated relative to a horizontal axis). Tyan does not address the need to recognize incidental text in a video image, *e.g.*, where the text may be distorted due to a camera angle and can not be read merely by rotating the text region relative to a single axis. Tyan thus fails to teach or make obvious a method of recognizing text in a captured imagery wherein a detected text region is adjusted "in three dimensions to produce a rectified image", as positively claimed by the Applicants in amended claims 1 and 16. Therefore, the Applicants submit that, for at least the reasons stated above, independent claims 1 and 16, as amended, fully satisfy the requirements of 35 U.S.C. §102 and are patentable thereunder.

Dependent claims 2-4, 9, 12-13, 17-19 and 22 depend from claims 1 and 16, and recite additional features therefore. As such, and for at least the same reasons set forth above with respect to the rejection of independent claims 1 and 16, the Applicants submit that claims 2-4, 9, 12-13, 17-19 and 22 are not anticipated by the teachings of Tyan. Therefore, the Applicants submit that dependent claims 2-4, 9, 12-13, 17-19 and 22 also fully satisfy the requirements of 35 U.S.C. §102 and are patentable thereunder.

III. REJECTION OF CLAIMS 14-15 UNDER 35 U.S.C. § 103

The Examiner rejected claims 14-15 under 35 U.S.C. §103(a) as being unpatentable over Tyan. The Applicants respectfully traverse the rejection.

Tyan has been discussed above. As discussed, Tyan fails to disclose or suggest a method of recognizing text in a captured imagery wherein a detected text region is adjusted "in three dimensions to produce a rectified image", as positively claimed by the Applicants in independent claim 1.

Dependent claims 14-15 depend, either directly or indirectly, from claim 1 and recite additional features thereof. As such and for at least the same reasons set forth

above with respect to the rejection of independent claim 1, the Applicants submit that claims 14-15 are also not made obvious by the teaching of Tyan. Therefore, the Applicants submit that dependent claims 14-15 also fully satisfy the requirements of 35 U.S.C. § 103 and are patentable thereunder.

IV. STATUS OF CLAIMS 44-50

New claims 44-50 were added in Applicants' response submitted on April 30, 2004. However, the Final Office Action dated July 6, 2004 is silent on the status of these claims. Since these previously added claims present objected claims 5, 6, 10, 11, 20, 21 and 23 in independent form, which the Examiner indicated would be allowable in the Office Action of January 30, 2004, it is submitted that previously added claims 44-50 are in allowable form.

V. CONCLUSION

Thus, the Applicants submit that all of the presented claims now fully satisfy the requirements of 35 U.S.C. §102 and §103. Consequently, the Applicants believe that all of these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring the issuance of a final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Kin-Wah Tong, Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

10/18/04
Date

Kin-Wah Tong, Attorney
Reg. No. 39,400
(732) 530-9404

Moser, Patterson & Sheridan, LLP
595 Shrewsbury Avenue
Shrewsbury, New Jersey 07702